W5YI

America's Oldest Ham Radio Newsletter

REPORT

Up to the minute news from the world of amateur radio, personal computing and emerging electronics. While no guarantee is made, information is from sources we believe to be reliable.

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In This Issue...

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The 1996 Amateur Radio Year in Review!

Every year about this time we pause to reflect on what has happened to Amateur Radio during the past 12 months. Being tied to technology trends, ham radio is naturally always changing. And 1996 was no exception! Here are what we feel are the major stories of the past year.

Ham radio is changing

All of the growth in ham radio is coming at the VHF and higher frequency microwave bands. Back in the 50's, 60's, and 70's - ham radio meant low band DX, sideband and long-range HF rag-chewing. The pool of HF operators is now drying up (as low band equipment manufacturers and ham radio dealers universally verify.) The "Experimental World Above 50 MHz" has now become the operating spectrum of choice for today's new breed.

The No-Code Technician continues to show the biggest increases in the number of ham operators. There are 6.7% more Technician and Tech Plus operators than a year ago; 43% of all Amateurs hold these licenses. (More than double the 20% "market share" of a decade ago.)

And for the first time ever, the combined census of Amateur Extra, Advanced and General Class operators actually showed a decline last year! In total, the number of ham operators did increase slightly. Very slightly ...less than 1% - with all of the increase coming at the No-Code Tech level.

Follows is the Amateur Radio individual station census over the last couple of decades. Keep in mind that the number of individual Amateur Radio stations was somewhat overstated during the period 1989 to 1993 due to the implementation of the ten year term license. During this period no ham licenses expired at all! In 1984 the FCC began issuing ten year tickets which did not begin expiring until 1994. The last five year term licenses (issued until December 1983) expired in December 1988. This artificially increased ham radio growth.

Census of Active Amateur Radio Stations - (Dec 1st)

Year	Extra	Adv.	Gen.	Tech.*	Nov.	Total:
1978	22204	82860	118363	68508	61227	**353162**
1979	24160	84959	122747	69076	61313	**362255**
1980	26455	88933	124364	70161	72093	**382006**
1981	29603	94174	125848	76715	79677	**406017**
1982	31342	94467	119576	75545	87814	**408744**
1983	34264	95590	118191	76799	86035	**410879**
1984	35910	97370	116887	80191	80565	**410923**
1985	38305	97781	117082	83387	77087	**413642**
1986	40989	97821	115998	85431	79019	**419258**
1987	43608	98383	114396	92618	82296	**431301**
1988	46735	98465	112974	100878	78988	**438038**
1989	50070	101904	116944	114507	85022	**468447**
1990	53520	105102	119552	126543	92230	**496947**
1991	57174	107485	122462	155368	96711	**539200**
1992	60986	109769	124924	189721	98950	**584350**
1993	65127	112705	127185	225521	100098	**630636**
1994	68062	114888	128843	254048	98809	**664650**
1995	72380	117089	129962	289483	97080	**705994**
1996	73518	114404	126714	308931	88192	**711745**

** = Includes both Technician and Tech. Plus operators.*

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Between 1989 and 1993, the U.S. Amateur Service grew by about 7.5% a year. In 1994 and 1995, the ranks grew by about 6% a year. And then it stopped. You will find the 1995 and 1996 census on page 4.

The real bad news is that the number of people taking ham radio examinations has been dropping since 1993. This past year was the worst ever! VEC records show that 17,000 less examinees were administered 30,000 fewer examination elements. (See page 5.)

There is all sorts of speculation as to why wireless ham radio is in the doldrums. But one would have to believe that the immense popularity of the "wired world" is a factor. No licenses, no exams, ...no rules. Working DX and "chat" is certainly a lot easier and more predictable. And the Internet is only in its infancy!

JANUARY:

- On January 25, the FCC affirmed the secondary allocation of the 219-220 MHZ band for "digital backbone" use by the Amateur Service. The ARRL had requested the additional 1.25-meter spectrum to help compensate Amateurs for the loss of 220-222 MHZ which was reallocated to narrowband business communications. An Order approving the allocation was released on March 22.
- At the beginning of the year, pending rulemaking included petitions seeking an increase from 2 to 4 in the number of amateurs needed to form a club, recognition of a VE Session Manager, a Special Event Call Sign System and examination credit which would be valid for life. At year end they were still pending.
- The ARRL adopted a resolution at their Annual Board Meeting authorizing League President to appoint a committee which will examine simplification of the Amateur licensing structure to insure the future health and growth of the service.

FEBRUARY:

- President Clinton signed the massive Telecommunications Act of 1996 in law on February 6. The primary goal of the legislation is to break down the regulatory barriers that separate the nation's telecommunications industries. Tucked away in Section 403 was Amateur Service legislation that abolished certain conflict-of-interest, record keeping and annual financial certification requirements in the VEC (Amateur examination) System.
- On February 28th, the FCC repealed these burdensome VEC System rules. There are no longer any prohibitions precluding VEs or VECs from publishing, manufacturing or distributing Amateur license study material or station transmitting equipment ...or from being employed by a company that does.
- The League filed a petition on February 7th seeking to expand protection of Amateur antenna structures. ARRL argued that city regulation of antennas generally has not worked and that local laws and deed restrictions inhibit Amateur station construction and operation.

MARCH:

- Amateurs - especially those with repeater coordination and VHF/UHF interests - filed comments in opposition to ARRL's December 1995 petition proposing relaxation of spread-spectrum emission restrictions. The League wants to make it easier for Amateurs to experiment with SS codes not currently permitted by the Rules. Commenters particularly opposed expanding the types of spread spectrum techniques below 450 MHZ. Digital enthusiasts, however, generally supported the petition. To many old timers, it sounded like the AM versus SSB debate of more than 40 years ago.
- On March 15th, the ARRL sent the FCC a scathing critique of the agency's dismal record in amateur enforcement and interference handling.
- Three SAREX space flights took place in 1996. Shuttle Astronauts aboard Atlantis got to speak with many school children via ham radio during its March 22-31 mission to bring Astronaut Shannon Lucid to the Russian Space Station Mir. Although not a ham, the Russians approved her use of the Mir RØMIR call sign and their 2-meter radio. Many amateurs worked her on 145.55. In June, ham astronauts aboard STS-78 also contacted students at various schools. STS-79 picked up Shannon Lucid from the Mir space station in September and replaced her with astronaut John Blaha, KC5TZQ.

APRIL:

- The FCC announced a new Consumer RF Interference Policy on April 5th in which it states that the cause of most RFI to home equipment is most often its design or construction. Amateurs have long recognized this fact, but now the Commission has put it in writing. Each year the FCC receives thousands of complaints of interference to televisions, radios, audio systems, telephones and other home electronics equipment.
- Also on April 5th, the FCC said that large commercial ships no longer need to carry manual Morse code equipment if it is equipped with the newer Global Maritime Distress and Safety System (GMDSS) satellite communications.
- The Future of Amateur Service Committee (FASC) tentatively concluded that the international law that requires Amateurs to be Morse proficient when operating on HF should be removed as a treaty requirement. The FASC is an international panel looking into needed changes in the international radio regulations other than spectrum issues.
- On April 10th, TAPR (the Tucson Amateur Packet Radio Corporation) filed a Request for Special Temporary Authority (STA) with the FCC requesting permission to experiment with hybrid spread spectrum emissions as well as spreading codes not envisioned by the Rules. ARRL opposed TAPRs suggestion that the STA permit

SS operation on the 6m, 2m and 1.25-meter bands. The FCC granted the STA to TAPR on November 8.

MAY:

- Repeater frequency coordinators came up with a plan which will provide the FCC with a single point of contact (SPOC). Their approach looked toward creating the National Frequency Coordinator's Council (NFCC) which will establish and oversee an independent National Frequency Coordinator's Office. A Memorandum of Understanding was entered into with the ARRL.
- The Dayton HamVention was moved from its traditional last weekend in April to the third weekend in May due to a long conflict with graduation at the University of Dayton. Attendance was down. But then attendance during most 1996 ham conventions have been less.
- The FCC created the Family Radio Service, the first new Citizens Band Radio Service since 27 MHZ CB. The non-licensed low-power FRS will operate on 14 channels sandwiched in between 462/467 MHZ GMRS spectrum.
- Gate One of the Vanity call sign program opened on May 31st to previous call sign holders and close relatives of deceased former holders. With a close relative's approval, Gate 1(A) - which opened on July 22nd - allowed the ham club of a deceased former holder to obtain his/her former call sign.

JUNE:

- The FCC's Industry Working Group (IWG-2A) was inundated with e-mail messages during early June when the ARRL mobilized Amateurs to help defeat a threat to the 2-meter and 70-cm ham bands. The working group is looking for a new home for low-earth orbit mobile satellites ("Little LEOs") and said it was considering Amateur 144-148 and 420-450 MHZ spectrum.

JULY:

- In a Notice of Inquiry, the FCC's Office of Plans and Policy asked for comments on how they could do a better job with less resources. We suggested that VECs who are limited by statute to recovery of expenses from license examination candidates, be permitted to charge additional fees for additional services such as the handling of license renewals and modifications. On July 17th, the FCC issued a waiver permitting VECs to electronically file Amateur Service renewals and modifications.
- Pleasure boat and aircraft radio licensing is being abolished under new statutory authority granted by the 1996 Telecom Act. Boaters and private aircraft owners traveling on domestic voyages and flights will now have their on-board radios blanket licensed by rule. Previously, the FCC only had authority to blanket license the Citizens Band and R/C (Radio Control) Services. The FCC action will eliminate the filing of approximately 125,000 license applications each year which will save the public more than $5 million in filing fees.

AUGUST:

- The FCC adopted new guidelines and methods for evaluating the environmental effects of radiofrequency (RF) emissions from FCC-regulated transmitters including those operating in the Amateur Service. The new RF safety guidelines are more strict and are based on recommendations of various federal health and safety agencies. The new RF exposure standard will apply to station applications filed with the FCC after January 1, 1997. It specifies two tiers of exposure criteria; one tier for "controlled" environments and another more stringent "uncontrolled" tier involving the general public. Ham operators will now demonstrate their knowledge of the new guidelines through examinations. Additional RF safety questions are being added to the Novice, Technician and General Class written examinations. In addition, Amateur operators transmitting with more than 50 watts peak-envelope-power must complete a routine evaluation to insure that they do not exceed the RF safety guidelines. The ARRL filed a Petition for Reconsideration of the new RF exposure rules.

SEPTEMBER:

- Gate 2 of the Amateur station "Vanity" call sign system opened to Extra class operators on September 23rd. But applicants had to wait until November 4th for call signs to be issued due to a computer problem at the FCC and the necessity to issue new call signs on a more equitable random basis. More than 6,000 "Vanity" call signs have now been issued.
- The FCC proposed new regulations on September 20th looking toward permitting certain foreign Amateurs to operate their stations while on short visits to the United States. The new European CEPT and Inter-American CITEL arrangements will permit U.S. reciprocal Amateur operations without the necessity of first obtaining another license or permit from the host country.

OCTOBER:

- Just before adjourning on October 3rd, the Congress ordered the auctioning and reallocation of the 2305-2320 MHZ band to business wireless services. The Amateur Service will still retain secondary access.

NOVEMBER:

- The ARRL feels that the existence of commercial licensees in the 2305-2310 MHZ band will diminish Amateur use. On November 19th, the League petitioned the FCC to designate the Amateur Service as the primary user of the 2300-2305 MHZ band.

DECEMBER:

- The VECs Question Pool Committee released new Element 2 (Novice) and Element 3A (Technician) license examination questions into the public domain. There are nearly 50% more questions in these pools ...due primarily to the addition of 176 new RF safety oriented questions.

AMATEUR SERVICE CENSUS - INDIVIDUAL STATIONS - DECEMBER 1, 1995 vs. DECEMBER 1, 1996

State	Extra		Advanced		General		Tech Plus		Technician		Novice		Total		%
	1995	1996	1995	1996	1995	1996	1995	1996	1995	1996	1995	1996	1995	1996	Inc.
AL	1127	1160	1732	1696	1794	1766	2129	2299	2684	2929	1006	905	10472	10755	+2.7%
AK	328	329	538	522	639	624	543	571	711	759	435	392	3194	3197	+0.1%
AZ	1500	1568	2597	2581	2700	2645	2843	3087	3863	4193	1239	1139	14742	15213	+3.2%
AR	740	766	1059	1051	1061	1056	1238	1346	1806	1969	609	556	6513	6744	+3.5%
CA	8777	8855	16204	15624	16601	16043	22423	23372	27119	29337	16820	15539	107944	108770	+0.8%
CO	1240	1273	2130	2116	2157	2081	2260	2426	2480	2698	1302	1193	11569	11787	+1.9%
CT	1120	1131	1572	1513	1932	1879	1766	1833	1394	1485	1660	1510	9444	9351	(1.0%)
DE	197	202	232	235	296	293	304	329	261	267	207	187	1497	1513	+1.1%
DC	81	79	93	95	134	124	64	70	74	65	78	62	524	495	(5.5%)
FL	4356	4445	8036	7875	9419	9308	7864	8402	6965	7317	6773	6211	43413	43558	+0.3%
GA	1565	1601	2579	2564	2627	2596	2998	3221	3127	3335	1490	1367	14386	14684	+2.1%
HI	321	327	517	504	562	551	682	702	619	668	688	649	3389	3401	+0.4%
ID	336	342	600	595	728	715	705	786	962	1086	405	369	3738	3893	+4.1%
IL	2609	2656	4198	4096	4831	4647	4852	5106	4745	4963	3528	3193	24763	24661	(0.4%)
IN	1521	1534	2435	2371	2787	2723	3359	3587	3323	3541	2046	1833	15471	15589	+0.8%
IA	735	743	1437	1403	1523	1458	1199	1236	1176	1267	1065	972	7135	7079	(0.8%)
KS	747	742	1182	1167	1603	1529	1369	1511	1716	1742	1032	908	7649	7599	(0.7%)
KY	861	915	1222	1214	1463	1435	1709	1849	2210	2410	1185	1083	8650	8906	+3.0%
LA	848	850	1368	1318	1420	1361	1406	1478	1592	1661	910	808	7544	7476	(0.9%)
ME	499	500	732	712	1050	1017	772	818	840	928	558	511	4451	4486	+0.8%
MD	1509	1500	2304	2232	2259	2198	2164	2401	2374	2306	1472	1355	12082	11992	(0.7%)
MA	2082	2079	2794	2668	3351	3251	3246	3325	2462	2635	2263	2083	16198	16041	(1.0%)
MI	2214	2283	3673	3569	4321	4221	4294	4530	4412	4797	2603	2329	21517	21729	+1.0%
MN	1171	1177	2018	1964	2341	2271	2012	2169	2089	2219	1295	1161	10926	10961	+0.3%
MS	493	516	826	815	854	855	832	907	1131	1218	537	491	4673	4802	+2.8%
MO	1408	1422	2282	2227	2642	2572	2319	2500	2603	2860	1530	1376	12784	12968	+1.4%
MT	307	313	465	469	593	578	451	525	685	746	365	334	2866	2965	+3.5%
NE	400	394	791	766	981	948	767	816	695	717	485	434	4119	4075	(1.1%)
NV	411	423	701	702	826	840	718	828	1030	1126	366	340	4052	4259	+5.1%
NH	654	667	760	751	987	955	996	1059	948	1022	575	525	4920	4979	+1.0%
NJ	2203	2198	3235	3111	3533	3396	3688	3775	2797	2888	2603	2395	18059	17763	(1.6%)
NM	616	622	944	926	908	882	837	911	1365	1477	374	320	5044	5138	+1.9%
NY	3869	3832	5872	5620	6842	6567	7177	7412	6774	7217	6907	6073	37441	36721	(1.9%)
NC	1837	1928	2893	2896	3090	3094	3326	3604	4167	4488	1973	1870	17286	17880	+3.4%
ND	162	159	250	245	375	370	313	349	344	361	243	224	1687	1708	+1.2%
OH	3162	3195	5030	4912	5637	5472	7466	7764	6665	7074	4080	3645	32040	32062	+0.1%
OK	945	968	1524	1487	1487	1444	1845	1935	2263	2568	1115	999	9179	9401	+2.4%
OR	1244	1288	2201	2157	2745	2690	2357	2635	2629	2803	1605	1403	12781	12976	+1.5%
PA	3082	3093	4545	4444	5211	5095	5142	5432	4396	4643	3594	3171	25970	25878	(0.4%)
PR	280	286	580	587	750	787	2247	2364	665	756	4295	4017	8817	8797	(0.2%)
RI	335	349	378	363	538	512	587	628	387	407	413	377	2638	2636	(0.1%)
SC	694	725	1103	1106	1364	1338	1278	1399	1350	1443	681	619	6470	6630	+2.5%
SD	180	177	318	312	380	367	256	284	281	303	174	162	1589	1605	+1.0%
TN	1508	1533	2383	2364	2308	2305	3040	3230	3159	3373	1463	1316	13861	14121	+1.9%
TX	4718	4807	7591	7484	7809	7595	8281	8769	9158	9893	4353	3928	41911	42476	+1.3%
UT	478	498	834	832	768	758	1616	1723	2774	3125	748	691	7218	7627	+5.7%
VT	260	264	335	326	434	426	403	420	514	558	230	210	2176	2204	+1.3%
VI	53	51	56	52	80	82	58	58	71	74	46	41	364	358	(1.6%)
VA	2096	2136	3118	3069	3086	3026	3161	3500	3422	3550	2016	1842	16899	17123	+1.3%
WA	2382	2446	3823	3749	4580	4431	4807	5194	5524	5962	3076	2791	24161	24573	+1.7%
WV	581	596	751	733	948	930	1195	1278	1799	1971	844	724	6118	6232	+1.9%
WI	1174	1195	1871	1838	2192	2143	1878	2026	2242	2392	1271	1148	10628	10742	+1.1%
WY	180	181	241	237	283	287	290	313	408	418	219	194	1619	1630	+0.7%
Other	177	188	136	139	163	177	206	249	497	580	230	227	1409	1560	+10.7%
Total	**72,380**		**117,089**		**129,962**		**139,738**		**149,745**		**97,080**		**705,994**		
%Total '96	**73,518**		**114,404**		**126,714**		**148,341**		**160,590**		**88,192**		**711,745**		**+0.8%**
% Increase	**+1.6%**		**(2.3%)**		**(2.5%)**		**+6.2%**		**+7.2%**		**(9.2%)**				
'95 %	10.3%		16.6%		18.4%		19.8%		21.2%		13.7%		100%		
'96 %	10.3%		16.1%		17.8%		20.8%		22.6%		12.4%		100%		

Volunteer Examiner Coordinator Report - 1995 vs 1996

Report indicates number of examination sessions, persons examined, total elements administered and average session size for the last two years. There were 17.4% less applicants taking 17.6% less examination elements in 1996 versus 1995. *(* = Figures are actual through November 1996 with estimate for December 1996 based on trend.)*

	SESSIONS			PERSONS			ELEMENTS			AVE. SESSION SIZE		
Month	1995	1996	% Inc.	1995	1996	% Inc.	1995	1996	% inc.	1995	1996	% Inc.
Jan.	942	842	(10.6%)	8330	6222	(25.3%)	14355	10345	(27.9%)	9	7	
Feb.	951	881	(7.4%)	9516	7226	(24.1%)	16230	12346	(23.9%)	10	8	
March	1067	1083	+1.5%	11050	10193	(7.8%)	18726	17242	(7.9%)	10	9	
April	1080	1087	+.6%	10895	9670	(11.2%)	17896	16615	(6.6%)	10	9	
May	1089	971	(10.8%)	10043	7557	(24.8%)	16985	12664	(25.4%)	9	8	
June	977	913	(6.6%)	8045	6747	(16.1%)	13563	11264	(17.0%)	8	7	
Jul y	837	755	(9.8%)	6526	5155	(21.0%)	11086	8710	(21.4%)	8	7	
Aug.	821	819	+.2%	6533	5674	(13.2%)	11085	9435	(14.9%)	8	7	
Sept.	921	848	(7.9%)	6498	5181	(20.3%)	11096	8844	(20.3%)	7	6	
Oct.	840	847	+.8%	6398	5271	(17.6%)	10930	8892	(18.6%)	8	6	
Nov.	889	872	(1.9%)	6986	6114	(12.5%)	12007	10440	(13.1%)	8	7	
Dec.*	845	*804	(4.8%)	6726	*5556	(17.4%)	11370	*9369	(17.6%)	8	7	
Total:	**11259**	**10722**	***(4.8%)**	**97546**	**80566**	***(17.4%)**	**165329**	**136163**	***(17.6%)**	**8.7**	**7.5**	***(13.8%)**

These two charts pretty much tell you what is happening with Amateur Radio expansion. People are simply not taking new and upgrading license examinations like they used to. Up until 1992, the number of people being administered Amateur Radio license examinations steadily grew. In 1995, the number of testing sessions, persons being examined and especially examination elements administered decreased dramatically. This past year was worse yet - with 17,000 less examinees being administered 30,000 fewer examination elements. The top chart shows the number of test sessions, persons and elements administered by month during the past two years.

Examinations Administered Under VEC System by Year - 1984 to Present

Date	Sessions	% Inc.	Persons	% Inc.	Elements	% Inc.	Pass Rate
1984	413		8599		12633		47.5%
1985	3223	680.4%	41439	381.9%	62589	395.4%	58.2%
1986	3784	17.4%	42422	2.4%	61921	(1.1)%	59.7%
1987	4378	15.7%	49728	17.2%	81042	30.9%	60.6%
1988	4903	12.0%	53546	7.7%	89788	10.8%	61.0%
1989	5486	11.9%	57417	7.2%	96092	7.0%	61.5%
1990	6250	13.9%	64737	12.7%	105763	10.1%	60.8%
1991	8118	29.9%	103251	59.5%	172061	62.7%	66.2%
1992	10016	23.4%	115852	12.2%	193521	12.5%	65.6%
1993	10848	8.3%	113028	(2.4)%	193911	0.2%	65.0%
1994	11638	7.3%	106670	(5.6)%	194584	0.3%	65.2%
1995	11259	(3.3)%	97546	(8.6)%	165329	(15.0)%	55.2%
1996	10722	(4.8)%	80566	(17.4)%	136163	(17.6)%	55.0%
Total	**91038**		**934801**		**1565397**		**65.1%**

Little LEOs, Big LEOs ... and Gigantic LEOs

SATELLITE CELLULAR PHONES ARE ON THE WAY

GMPCS - Global Mobile Personal Communications by Satellite

What started out as an wild idea by ham operator, Bary Bertiger, WA7UKR is about to become reality! It is an unbelievable story. It seems that in 1985, Bary's wife Karen wanted to place a phone call from a remote area in the Bahamas back to their home in Chandler, AZ.

That got Bertiger, a Motorola engineer and now V.P. and general manager of its satellite-systems group, thinking. "Why not create a satellite-based cellular telephone system in the sky?" Instead of the user moving through a cell, the satellite would move overhead to the user.

Low Earth Orbit (LEO) satellites such as AMSAT's Phase 3D orbit the earth every couple of hours at a height of a few hundred miles above the earth. Their communications range depends upon the orbit. Since their moving footprint is only about 2,000 miles in diameter, a global communication LEO system requires a large number of satellites.

Little LEOs use a single satellite. Big LEO systems need multiple satellites. And like a terrestrial cellular system it needs to be able to hand over the service to the next neighboring satellite. WARC-92 (in Malaga-Torremolinos, Spain) allocated the mobile satellite service (MSS) spectrum needed. (1610-1626.5 MHz and 2483.5-2500 MHz.)

Since geostationary satellites orbit at a height of 22,300 miles it takes a quarter of a second for voice transmissions to make the 44,000 mile trip. (Speed of light - or radio - is 186,000 miles-per-second.) Besides being less expensive, there is no round-trip delay in LEO satellite systems. They can make the round trip almost instantly. The low altitude of Iridium satellites allows easy radio links with portable cellular radiotelephones on earth, using small antennas rather than satellite dishes. It also supports reuse of frequencies in a similar fashion to land-based cellular systems.

The Iridium system was conceived by engineers at Motorola's Satellite Communications Division in 1987. It got its name from the 77 th element on the periodic table because the original design called for 77 satellites. Their idea was to orbit a constellation of small (only 3-by-6 ft), lightweight (under 1,000 pound) LEO satellites with telephone switching equipment on board that could be built, launched and replaced economically. Iridium's 66 satellites will fly in eleven nearly polar orbits tilted 86 degrees to blanket the globe.

Motorola applied to the FCC for a license to construct and operate the Iridium system in December 1990. Four years later (January 31, 1995), the FCC awarded Motorola Satellite Communications, Inc., a license to construct, launch and operate the Iridium system.

Motorola's Iridium system will be able provide a global personal communications network including voice, data, fax or paging. Its 66 interconnected satellites will orbit 420 nautical miles above the earth. Its footprint will consist of 48 spot beams covering the entire earth's surface. The scientific community has nicknamed the system, "Bigfoot" since every point on the earth's surface is in continuous line-of-sight with one of the satellites. Each satellite is connected to four others and has a lifetime design life of five to eight years.

The system will greatly simplify communications for business professionals, travelers, residents of rural or undeveloped areas, disaster relief teams, and other users who need the features and convenience of a wireless handheld phone for worldwide use. Callers using the new system will not need to know the location of the person being called; they will simply dial that person's number to be connected instantly. A NASA-commissioned study compared mobile satellite services with personal computers, in terms of their potential impact on our lives.

Iridium uses two frequency bands. The subscriber and LEO satellites are connected via the L-band (1616-1626.5 MHz). The Ka band (29.2 GHz uplink/19.5 GHz downlink) is used between the satellite and terrestrial gateways which will interface with the public switched telephone network (PSTN.) Intersatellite crosslinks take place at 23.2 GHz. The digital standard will be TDMA (time division multiple access) which was accepted by the cellular industry in 1989.

The majority of calls will originate or terminate over conventional communications hardware. The Iridium handset is the primary means which callers will communicate directly through the Iridium network. Most phone calls will never go through a satellite. Its dual mode capability will allow it to work as a terrestrial wireless cellular telephone or a satellite telephone.

The cost of an Iridium phone call is rumored to be $3.00 per minute at the beginning! Certainly not cheap! Batteries will yield one hour of talk time and 24 hours of standby. Solar-powered portable and redeployable satellite phone booths are being designed to provide public access to Iridium in remote areas without telecommunications.

The first three Iridium satellites are scheduled to be launched next month from a 250 ton Delta rocket. Russian and Chinese rockets will also launch future Iridium satellites.

Iridium will soon have competitors. At least four more systems are on the way. But the biggest, most expensive LEO system with the most satellites deployed will be Motorola's Iridium. It will cost $3.4 billion ...more than the total of the other two U.S.-licensed Big LEO systems (GlobalStar and Odyssey) combined.

Motorola is the biggest single investor, but there are other American companies including Sprint, Raytheon and Lockheed. Most of the financing has been sold in chunks to an international consortium of leading telecommunications and industrial companies from Russia, Korea, China (Hong Kong), Africa, Italy, Thailand, Germany, Canada, Saudi-Arabia, India, Taiwan, South America and Japan. Iridium plans to be ready for full scale operation in 1998.

W5YI REPORT

America's Oldest Ham Radio Newsletter

January 1, 1997

EMERGING TECHNOLOGY

■ **Lucent Technologies, Inc., (a spin off from AT&T) has unveiled an interactive telephone** with a screen that links to a television set. Broadcasters can embed data into the TV signal which shows up on the phone screen. Announcers can instruct users to push a key on the phone to dial in and request more information. Lucent introduced its MediaLink "low cost interactive alternative" screen telephone at the Western Cable Show. The technology is aimed at the 85% of the population that does not use the Internet. It will be available next year.

■ **Access to the Internet by satellite will be available by the year 2000.** GE Americom plans to use 28 GHz satellites to provide Internet access to cable operators via cable modems ...and high speed direct access to home users with small ($1,000) Ka-band earth stations.

■ **IBM has a new "Cable On-Line" data service that includes high-speed Internet access.** It uses an IBM-designed cable modem and special software and switching hardware. The new technology allows a cable TV operator to provide a specific amount of bandwidth to each subscriber.

■ **Intel and Microsoft have introduced new standards** that permit people to make video phone calls over the Internet. The software, available free over the Web, requires at least Pentium 133 MHZ class PCS, a modem and a video camera. The pictures (set in a small window) are at 5 frames a second ...far slower than regular video on computers.

COMPUTER INFO

■ **Using 9,200 off-the-shelf Intel Pentium Pro microprocessors,** the US Dept. of Energy's Sandia National Laboratory and Intel scientists have built the world's fastest computer. It is 2½ times faster than any supercomputer and shatters the "teraflop" barrier, meaning that it can make more than a trillion calculations in a single second. Intel said that was equal to as many calculations as the entire US population could make working on a hand calculator for 125 years. The previous record was 3.68 gigaflops (or billion calculations per second) held by Hitachi Corp. of Japan. The new computer will be used to simulate everything from a nuclear explosion to a single strand of human DNA. The $53 million machine is being built under a contract from the Dept. of Energy.

■ **Thomson Consumer Electronics** (the same company that developed the RCA Digital Satellite System for DirecTV) has a new $300 TV set-top Internet access box based on Oracle's "NC" (Network Computer) standard. They will market several models under RCA ProScan and GE brand names. NC's are being introduced as low price alternatives to PCS and there will be many versions available from other companies next year. In addition, Thomson, working in collaboration with Compaq Computer Corp. will market a large screen (36-inch) RCA TV-PC in the Spring.

INTERNET NEWS

■ Industry trade journal, "**Advertising Age**" says that family-oriented Internet search engines (including Yahoo, Excite, Lycos and HotWired's HotBot) **are accepting adult banners advertising pornographic websites.** They say, so far, they have received no complaints. The adult banners pop up when certain words are keyed into the search engine.

And **Alta-Vista has begun accepting top-of-the-screen advertising banners for the first time.** They get some 24 million "hits" a day! Ads which are also related to entered keywords are being priced at $50 to $60 per thousand impressions.

Don't be surprised to be seeing personalized web advertising on your PC in the near future. There are several ad experiments underway to reach specific individuals rather than demographic groups. Some targeted ads will even include your name. Most are based on shared user survey profiles collected online. For example. people purchasing a plane ticket might find vacation offers in their e-mailbox or a cruise ad banner at the top of search screen. And user data (such as education level, hobbies, interests, age, name, e-mail address, household income....) can be stored on PCs for later access by advertisers.

■ **America Online is having big trouble keeping up with demand** now that it has changed to $19.95 unlimited service billing. Their demand has tripled and busy signals, dead dial tones, delays and dropped calls are plaguing the nation's largest consumer online service. AOL believes part of the problem is the heavy strain on local telephone companies.

■ **The Internet's heavy usage has caused the Baby Bells to ask the FCC to impose a fee on Internet providers.** In 1980, emerging online services were exempted from paying additional access fees. The telcos say that Internet activity can no longer be considered a fledgling service and they need funding to finance network upgrades. It is starting to look like telephone company customers will be indirectly paying a "per minute fee" for Internet access just as they do for long-distance service.

The computer industry (including such big names as Netscape, IBM, Intel and Microsoft) have formed DATA (Digital Affordable Telecommunications Access) to fight the charges.

WASHINGTON WHISPERS

■ The FCC has asked the Network Reliability and Interoperability Council (NRIC) to look into the impact of the growth of Internet traffic on the nation's public telecommunications networks and to recommend any future action that may be needed to insure network integrity. The study could be a prelude to possible Internet access fees being levied on service providers by the local Bell telephone companies.

NRIC said that no carrier has yet reported an event associated with Internet use that meets the threshold for reportable outages -- generally a network failure that deprives more than 30,000 customers of the ability to make a call for more than 30 minutes.

The Council agreed that with the Internet's present mix of applications, its growth does not pose any unusual network outage hazards. However, rapid Internet growth does represent a capacity management challenge often requiring rapid and costly equipment augmentation.

NRIC is a Federal Advisory Committee organized by the FCC to advise the Commission, and the telecommunications industry, on what steps can and should be taken to improve the reliability of the nation's telecommunications networks. Its members includes CEO-level representatives of telecommunications service providers, equipment manufacturers, telecommunications standards-setting organizations and consumer organizations.

■ **The FCC's Office of Public Affairs recently announced** the establishment of a new page on the Commission's Internet website that will provide worldwide access via the Internet to live and recorded audio broadcasts of selected FCC events. The

Commission began by broadcasting its December 13th Open Meeting through a RealAudio link on the FCC's Home Page.

Any time an Internet user connects or reconnects to the broadcast, they will hear a short welcome message from the system administrator before joining the meeting in progress. All live broadcasts will be recorded and made available on the FCC's new audio broadcast site at

http://www.fcc.gov/realaudio/

for future playback. The site will also include a schedule of upcoming events, a comment form and an e-mail address to solicit ideas on how to improve or add to its usability.

In order to listen to audio from the new site, you must have a computer with a sound board, speakers, and modem; and have access to the Internet via an Internet service provider, online service, or through a corporate network.

You must also have a web browser and the RealAudio Player software program -- free from Progressive Networks at:

http://www.realaudio.com/

■ **At its Dec. 13th meeting, the FCC has suggested new rules that would make it easier** for inventors, students, manufacturers and entrepreneurs to experiment with new radio technologies, equipment, characteristics of radio wave propagation, and new service concepts related to the use of the radio spectrum.

The Experimental Radio Service (ERS) provides for the experimental use of radio frequencies and for the development of techniques and systems not otherwise permitted under existing service rules. The proposed changes would simplify the regulatory structure, encourage experimentation, and facilitate technical innovation and the development of new services, FCC said.

The new proposed new rules permit longer license terms; blanket licensing of related multiple experiments, electronic filing of applications; encourage student experiments by issuing licenses to schools, as well as to individual students; encourage special temporary authorizations (STAs), and eliminate several burdensome regulatory administrative requirements. Experimental stations are issued station call signs very similar to Amateur Radio. (2-by-3 format from the WA2XAA-WZ9XZZ and KA2XAA-KZ9XZZ call sign blocks.) Public comments are requested. *(By NPRM, FCC 96-475).*

AMATEUR RADIO

■ After two decades with the FCC, popular **Bob McNamara, N1KHF has left the Wireless Telecom Bureau** for greener industry pastures. He has accepted an executive position with position with Nextel Communications Inc, a major telecommunications service provider. His Private Wireless Division Chief duties will be assumed by deputy, David Horowitz. The division oversees Amateur Radio, personal radio, maritime, aviation and other wireless services.

■ **The FCC has already issued nearly 6,000 "Vanity" call signs.** And more are on the way! The FCC still gets about 400 requests a week, half of them filed electronically over its website. We spoke to the FCC last week and was told that no date has yet been set for the opening of Gate 3 to Advanced Class license holders.

■ **A new law in Guatemala effectively abolishes all ham bands** between 2-meters and 6-mm in that Central American country! And the 70-cm (430-440 MHz) band has already been declared available for commercial use.

The law divides the electromagnetic spectrum into three user categories: amateur radio, government radio and commercial radio ...which will be auctioned off to the highest bidder for a term of 15 years.

There are no changes in the HF ham bands in Guatemala, but effective January 18, 1997 only the 6-meter and 2-meter bands will remain in the UHF and SHF range. The VHF and EHF Amateur Radio assignments in Guatemala are: 50-54 MHz, 144-148 MHz, 24-24.05 GHz, 47-47.2 GHz, 75.5-76 GHz, 142-144 GHz, and 248-250 GHz.

AMSAT is especially concerned about Amateur satellites (including the upcoming P3D scheduled for an April 1997 launch) picking up and retransmitting Central American commercial telecommunications between 435 and 438 MHz.

■ **Astronaut John Blaha, KC5TZQ has been heard making many QSOs** from the Mir Russian Space Station. Dr. Dave Larsen, N6CO (ex N6JLH) is acting as Mir QSL manager for the US and Canada. He may be reached at: N6CO @ NØARY.#NOCAL.CA.US.NOAM (packet) or doc@volcano.net (Internet).

■ **Hams around the world!** We received a nice holiday greeting card from the JARL (Japan Amateur Radio League) along with an interesting full color brochure entitled "**Amateur Radio in Japan.**"

The JARL says that according to information received from the IARU (International Amateur Radio Union), the following ten countries had the most Amateur Radio stations at the end of 1995:

1)	Japan	1,365,000
2)	U.S.A.	714,000
3)	Germany	76,500
4)	England	63,000
5)	Indonesia	60,500
6)	Spain	47,500
7)	Russia	38,000
8)	Argentina (Tie)	30,000
8)	Italy (Tie)	30,000
10)	Brazil	27,000

Japanese Amateur Radio operator licenses are valid for life and apparently no records are kept on the number of operators. Once licensed, an operator applies to the Ministry of Posts and Telecommunications for a station license. Station licenses are for five years and can be renewed.

Japan has four license classes. First and Second Class hams are authorized all amateur modes, frequencies and privileges. The Second Class is limited to 200 watts or less. Third Class is authorized 50W or less above 18 MHz and below 8 MHz.

The Fourth Class is the only one that does not require Morse code. Privileges include all frequencies above 21 MHz and below 8 MHz. Power limited to 10W on HF, 20W on VHF and above. Most Amateurs hold the Fourth Class license which is obtained by attending a JARD (Japan Amateur Radio Development Association) training session. First and Second Class licenses require passing a national examination.

JARD was established in 1991 by the JARL to handle Amateur radio operator training and applications. JARD also sets the technical standards for Amateur radio equipment and provides "...supervision to maintain orderly use of Amateur radio."

The Japanese ham bands are pretty much the same as the US - except there is no 1.25-meter (222-225 MHz) band.

■ **We spoke to Mike Lamb, N7ML, former president of AEA last week.** He told us that he is presently in the process of selling its three product lines (data products, test analyzers and antennas) to other US companies. Letters of intent have been received and agreements are being drafted. "Because of holiday delays, it is anticipated that the sales will be consummated by early January. The new parties will likely offer warranty and out-of-warranty service to old AEA customers," Mike said. An official announcement will be made as soon as the sales are complete. Mike promised to get back to us with more details shortly. We will keep you posted.

THE RADAR DETECTION vs. RADAR UNIT BATTLE

Up until a few years ago, all speeders had to contend with was radar. But with today's technology, it has now gotten very complicated. Traffic radar is authorized in four bands. Radar operates in the X-band (10.5-10.55 GHz), the K-band (24.05-24.25 GHz) and the newer Ka-band (33.4-36.0 GHz.) Laser units operate at 904-nanometers, just outside the visible spectrum range.

Most traffic radar operates in the X and K-bands. Detecting police radar in the newer Ka band is much more difficult since the frequency is deliberately chosen to be the third harmonic of the X-band. This complicates detector design which must have reduced X-band sensitivity to avoid false alarms from field disturbance sensors operating in this band. Both the X and K bands are also authorized ham bands. You can expect more police radar radio-interference errors as the Amateur operation moves up in frequency. Mobile transmissions can cause severe ghosting and false readings.

Radar works by measuring the frequency difference between the sent and received signal. This is known as the Doppler shift principle. If the target is getting closer, the reflected frequency is higher. Moving away: a lower frequency is sent back. Radar units simply look for these reflections or "echoes."

Unlike large and powerful air traffic control and military radar systems, police radar is not very complex at all. It has to be low priced (due to municipal budgets), be small (fit on a dashboard) and use low power (due to a vehicle's electrical capacity.) Like a flashlight, the lower the power, the lower the range.

Conventional police radar can't measure distance or distinguish one target among many. The radar operator really must decide who is going the fastest. And the smaller and more angled the vehicle the harder it is for the radar to see it. That is why stealth radar-avoiding aircraft are sleek, thin and swept back.

Popular with motorcycle police, two-piece **stationary radar** guns are outlawed in some states (such as Connecticut) as a health hazard to the operator. **Mobile radar** is a little more advanced and the operator is able to check speeds while moving or stationary. While moving, the patrol car and the target vehicle speed are both measured by the radar unit and an internal calculator produces the final target speed reading. It does this by assuming the strongest reflections are nearby terrain and the second strongest echo is the target.

Moving radar calculates target speed by subtracting patrol speed from the closing speed of the target. Anything that produces a low evaluation of patrol speed will automatically result in a high of target speed reading. Moving radar units are much more prone to error readings than stationary models.

So-called **instant-on radar** exists only to defeat radar detectors. A radar operator manually activates a warmed up unit when he sees a potential target. The radar does not automatically turn itself on as some people think. The newest wrinkles are laser, photo and red light radar.

Laser radar is not really radar at all. "Radar" stands for RAdio Detection And Ranging. Lidar, (for LIght Detection And Ranging) as it is more accurately known, uses pulsed invisible infrared light laser bursts. Instead of using the Doppler shift principle, lidar measures the time between sent and received pulses.

Laser guns must be held very steady to get an accurate reading, therefore they can only be used when the unit is stationary. Lidar can also calculate distance to the target as well as speed and have a longer range. They can hit a small 4-foot target at 1000 feet. Halogen type car headlights greatly reduce their range. Laser units can cost $4,000 (versus $1,000 for regular radar) and are not as popular with municipal governments.

Automated ticket writers are proliferating!

Photo radar is a controversial automatic speed trap robot which can be operated day or night in any type of weather as a portable device (in a trailer, on a tripod or in a motor vehicle) or permanently installed in the environment (such as in an overpass or sign.) It is basically a stationary radar unit lashed to a notebook computer (set at a speed over the speed limit) and a still camera (loaded with 800-frame film.) Most units are manufactured in Europe or Australia and operate in the K band. A few use the Ka band.

Most photo speed traps are set slightly higher than the ACPO (Association of Chief Police Officers) speeding guidelines which allows a leeway of 10% over the posted speed limit plus 2 mph. Cars exceeding the preset speed will have their rear license plates photographed along with the speed, date and time superimposed.

These speed cameras do not face oncoming traffic since the flash could pose a safety hazard to drivers - especially at night. Radar detectors perform very poorly against these "reverse slant" (aimed ahead) speed cameras. Experiments are underway with infra-red flash and IR-sensitive film which permits "forward slant" photo radar to photograph not only the front license plate but the driver as well. Another device (called the "Live-Link Gatso") substitutes a video camera which is received by police monitoring sites in real time.

Police departments frequently do not operate their own photo radar. Instead these units are rented from outfits who retrieve, develop the film and print the pictures. Some even provide municipalities with the registered car owner's name and address. All the city has to do is to mail out the photo along with the citation and collect the fine. It is assumed that the car owner is the driver unless the owner provides information to the contrary ...a legally questionable guilty until proven innocent circumstance. At least one vendor who leases photo radar equipment to communities works on a commission basis and is paid $20 for every paid ticket.

The states of Wisconsin and New Jersey have banned photo radar. Some states (such as Utah) only

allow the use of photo radar in school zones or in areas of known high speed incidence. The cities of Beaverton and Portland, Oregon are in the process of conducting a "photo radar demonstration project." San Jose has its NASCOP (Neighborhood Automated Speed COmpliance Program.) Cities in Florida, Missouri, Hawaii, Illinois, Maryland, Michigan, Minnesota and Washington, DC have test locations. You can find out more about where photo radar is in use by searching the Internet. There are several photo radar reporting websites.

On the other hand, many municipalities that have tested and considered photo radar have ended up rejecting or withdrawing them from use ...including several cities in Arizona, California, Illinois, Missouri, Nevada, Texas and Washington state.

"PhotoCops" (as they are known) remain, however, a low cost money maker for many cities and states. Photo radar is intended to produce the most citations possible with the least amount of effort. Where photo radar is used, speeding tickets - and ticket revenue - have increased dramatically. A major selling point of photo radar is that it can quickly pay for itself.

Photo radar has really been around some time, but is only now coming into its own. It was invented in the Netherlands by a race car driver by the name of Maurice Gatsonides. The Gatsometer is manufactured in Holland and distributed in the United States by U.S. Public Technologies, Inc. The Dutch factory is now run by Tom Gatsonides, Maurice's son. Gatsometer also makes red traffic light cameras - which are affectionately known as "RLCs."

Red Light Cameras

Running red lights results in the most frequent type of car crash and occupant injury. Most are run during peak travel times when police are least able to safely apprehend the driver. **Red Light Cameras** help communities enforce traffic laws by automatically photographing the license plates of vehicles whose drivers run red lights. Here is how they work.

A red light camera is connected to the traffic signal and to sensors buried in the pavement at the crosswalk or stop line. The system continuously monitors the traffic signal and the camera is triggered by any vehicle passing over the sensors above a pre-set minimum speed and a specified time after the signal has turned red. The camera records the date, time of day, time elapsed since the beginning of the red signal and the speed of the vehicle. Drivers who enter on yellow and find themselves in an intersection when the light changes to red are not photographed. The technology is intended to catch motorists who intentionally enter an intersection well after the signal has turned red.

A red light camera costs about $50,000. Installation and sensors cost about $5,000. A single red light camera can be used at several locations once the sites are equipped to work with the camera, allowing communities to move cameras between sites without drivers knowing which ones are active at any given time. Fake ("dummy") cameras are also sometimes installed.

Startup costs are offset by fines paid by violators, savings from crashes prevented and by freeing police to focus on other enforcement efforts. Many U.S. communities use RLC's including New York City, Los Angeles, Fort Meade, Florida, Arlington, VA and Jackson, Michigan. And more (...including San Diego, El Cajon and Poway, California) are on the way.

TruVelo - so called because it's measures True Velocity - consists of three rubber strips that you drive across. Or the sensors can be permanently imbedded in the pavement. They are installed a known distance apart and the time between compressions is measured to reflect vehicle speed. The system takes two readings per vehicle and computes the average for the resulting speed. It can measure the speed of vehicles traveling in either direction. A version made by Gatso, called Auto-Vision is hooked to a stationary camera.

Electronic Countermeasures

There are, of course, all sorts of radar detectors on the market. Some are better than others. These are super-heterodyne receivers that are aimed at radar units directed at the driver. Radar detectors are illegal in some states. The police now have a sensing gadget with an antenna that lets them know if you have a radar detector that is not visible. The "radar detector detector" (or "RDD") simply listens for the known intermediate signal frequency given off by the detector's local oscillator.

Many - and perhaps most - anti-speed trap devices are rip-offs. The "invisible" and radar/lidar-scattering number plates simply do not work. They have names like "The Mask."

"Flashbuster" is a legal license plate cover that uses state-of-the-art Lenticular Optics. According to their advertising, when photo radar tries to photograph your plate, a massive overexposure occurs. This is also questionable. And "Stealth Padding" (radar absorbing material) does not make your car invisible to radar. It merely reduces the detection distance.

"Passive Radar Jammers" claim to alter the signal returning to a radar gun by adding either "white noise" or "FM chirp" to the radar signal before the signal is reflected from the car to the radar gun. This altered signal is rarely strong enough to disrupt the radar unit from calculating the speed of the automobile. Most signals sent out by a passive jammer are drowned out by the reflections from the car and rejected by the noise canceling software of the radar gun.

Active radar jammers do neutralize radar, but they are illegal to use since they transmit a signal. They determine which radar band is being used and return a burst on the same frequency which is interpreted by the radar unit as its own return echo. The result: no speed reading is ever achieved. The firms that make them are very illusive and market their equipment through obscure 800 number answering services.